

Effect of Smoking on Maximum Voluntary Ventilation

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Abstract: Introduction: Cigarette smoking causes illness as its numerous pathophysiologic effects on the various systems of the body. It affects respiratory system and causes various diseases like chronic obstructive pulmonary disease, asthma, lung cancer etc. Material and Method: This study aimed to see the effects of smoking on the Maximum Voluntary Ventilation (MVV). For this study we selected 30 control and 30 cases and divided cases into mild, moderate, heavy smokers according to number of cigarette they were smoking daily. Maximum Voluntary Ventilation was performed by medspiror instrument in a standing posture. Result: We found that difference between predicted value and observed value is increased from mild smokers to heavy smokers in MVV. And the difference of mean value of MVV increases as the degree of smoking increases. Conclusion: It suggests that smoking starts obstructive changes in the respiratory system before the onset of respiratory symptoms. [Ghataliya S NJIRM 2018; 9(1): 138-139]

Key Words: Maximum Voluntary Ventilation, Respiratory diseases, Smoking

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Introduction: Cigarette smoking is widely prevalent in developing countries. Smoking is a form of systemic drug administration in the circulation, where entry is through pulmonary rather than portal or systemic circulation.⁵ Cigarette smoke is mixture of different compounds which are pharmacologically active, toxic, mutagenic and carcinogenic. It causes various pathophysiologic effects like change in central and peripheral airways, alteration in alveoli and capillaries, alteration in immune function. It leads to an imbalance between proteolytic and antiproteolytic forces in the lung possibly resulting in parenchymal destruction and air flow obstruction, which can lead to emphysema. The aim of the study is to inform about the hazards of cigarette smoking and discourage its use.

Methods: The present study was carried out in 30 healthy smokers and 30 healthy non-smokers. The control group (Non-smokers) was comparable in age, sex, economic status, socio-physical activity to study group (Smokers).

The inclusion criteria were as following: Age range – 20-40 years, Non – smoker – Never smoked for more than 6 months in lifetime and not smoked at all in preceding 1 year.

Exclusion criteria: Evidence of any chronic respiratory or cardiovascular disease (On history and physical examination). History of recent acute respiratory illness in preceding 6 week. Any thoracic or spinal deformity or muscular deformity. History of any drug

intake at the time of study. Family history of any cardiorespiratory disease.

Procedure: Data (age, height, weight, sex) of each subject at the room temperature was filled in medspiror instrument. Procedure was explained and demonstrated to the subject.

Maximum Voluntary Ventilation procedure was performed by the subjects after enough practice in standing position. Subjects performed inspiration and expiration as fast as and as deep as possible for 10 seconds. All actual and predicted values were obtained.

Results: The study was carried out in 30 healthy non-smokers and 30 healthy smokers divided in to three group further (Group 1: Mild smokers, Group 2: Moderate smokers, Group 3: Heavy smokers) showed following results(Table 2):

General examination and systemic examination of all the subjects were normal. Table 2 shows the mean age, height, weight, pulse rate, mean blood pressure in smokers and non-smokers.

The average duration of smoking was 7.5 years of smokers group. Non-smoker group shows non significant change in MVV than their predicted value. Smokers group shows significant lower value than their predicted value and the difference of mean value of MVV increases as the degree of smoking increases (Table 2).

Table 1 : Distribution of age, height, pulse rate, mean blood pressure in control and cases.

	Mean Age (in yrs)	Mean height (in cms)	Mean weight (in kgs)	Mean PR (per min)	Mean RR (per min)	MBP (mm of Hg)
Control (n=30)	26.13±2.93	168.7±7.66	64.77±10.60	80.66±5.52	15.73±1.55	91.90±3.79
Cases (n=30)	30.93±6.83	166.37±8.89	56.2±11.98	90.3±4.24	18±2.17	97±5.11

Table 2 : Shows Maximum Voluntary Ventilation (MVV) in control and cases.

	Actual mean value±SD (L/min)	Predicated mean value±SD (L/min)	%Predicted ±SD	Difference of mean value	P value
Control	139.57±13.90	142.43±9.19	98.03±7.92	2.86	>0.05
Mild smokers	104.8±13.18	138.1±14.29	76.68±12.53	33.3	<0.001
Moderate smokers	100.7±7.34	135.9±14.34	75.02±11.19	35.2	<0.001
Heavy smokers	87.7±19.43	133±9.33	66.11±15.02	45.3	<0.001

Discussion: Cigarette smoke contains various constituents like nicotine, tar, phenol, carbon monoxide etc.¹ which has various effects on the different system of the body. Cigarette smoke affects upper as well as lower respiratory system. It causes alteration of central and peripheral airway by loss of cilia, mucus gland hyperplasia, mucus plugging, smooth muscle hypertrophy etc.² It also causes alteration of alveoli, capillaries and immune function. It leads to an imbalance between proteolytic and antiproteolytic forces in the lung possibly resulting in parenchymal destruction and air flow obstruction, which can lead to emphysema.

Bridges RB, Wyatt RJ, Rehm SR studied that smokers exhibited a significant elevation in total peripheral leucocytes, ceruloplasmin, alpha 1 protease inhibitors. This rise is associated with present and cumulative cigarette consumption and impaired lung functions. These data supports the hypothesis that the smoking induced changes in inflammatory mediators are associated with the observed pulmonary dysfunction.³

O'Connor GT, Sparrow D, Weiss ST found that long term cigarette smoking may be associated with increased nonspecific airway responsiveness, which is associated with an accelerated longitudinal decline of pulmonary function.⁴

Conclusion: Smokers group shows significantly lower values of MVV than their predicted value. The difference of mean value of MVV increases as the degree of smoking increases. These data supports that smoking induced changes are associated with decrease in pulmonary function. It shows greater risk for lung disease. So, Tobacco control programme

aimed to inform the public about hazards of tobacco use in different form must be started in order to prevent tobacco induced morbidity and mortality.

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